

Space Robotics Challenge Project

Game Changing Development Program | Space Technology Mission Directorate (STMD)



ANTICIPATED BENEFITS

To NASA funded missions:

This technology provides potential benefits to any place humans explore. The humanoid robots can handle the dull, dangerous and dirty exploration, while humans use their problem solving abilities in situations where the robots require help. The application of these robots is to increase autonomy capabilities for both surface (R5/Valkyrie) and in microgravity (Robonaut). If successful, the results of this work could infuse directly onto Robonaut on ISS.

DETAILED DESCRIPTION

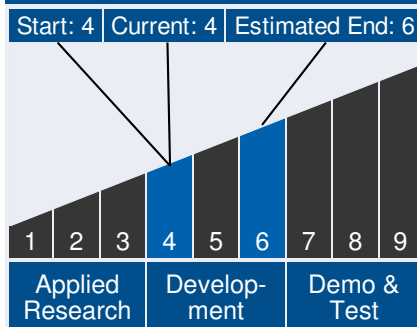
The Space Robotics Challenge seeks to infuse robot autonomy from the best and brightest research groups in the robotics community into NASA robots for future missions to Mars and/or the moon. In doing so, NASA will provide the country's most complex humanoid robots to these groups for testing.



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Technology Maturity



Management Team

Program Executive:

- Lanetra Tate

Program Manager:

- Mary Wusk

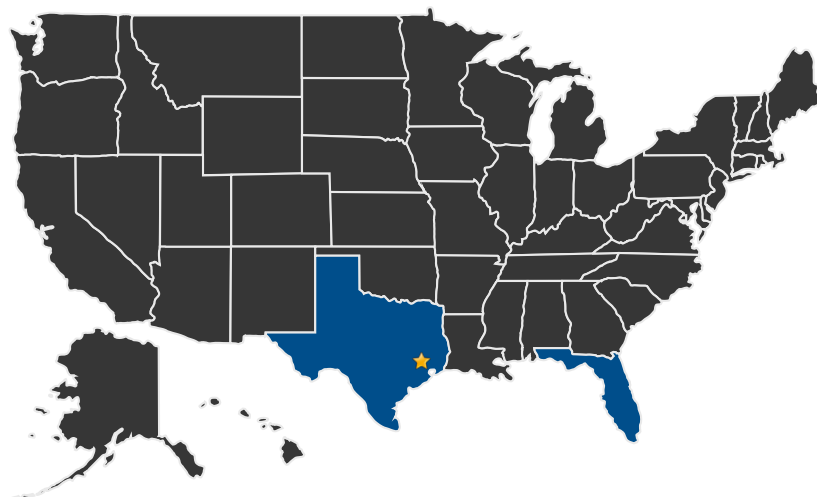
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U.S. WORK LOCATIONS AND KEY PARTNERS



■ U.S. States
With Work

★ **Lead Center:**
Johnson Space Center

Other Organizations Performing Work:

- Florida Institute for Human and Machine Cognition
- National Science Foundation

Management Team (*cont.*)

Project Manager:

- William Bluethmann

Principal Investigator:

- Robert Ambrose

Technology Areas

Primary Technology Area:

Robotics and Autonomous Systems (TA 4)

- └─ Mobility (TA 4.2)
 - └─ Small-Body and Microgravity Mobility (TA 4.2.4)
 - └─ Wheeled/Tracked/Hybrid Robots (TA 4.2.4.4)
- └─ Manipulation (TA 4.3)
 - └─ Mobile Manipulation (TA 4.3.4)
 - └─ Mobile Manipulation (TA 4.3.4.1)

Secondary Technology Area:

Robotics and Autonomous Systems (TA 4)

- └─ Human-System Interaction (TA 4.4)
 - └─ Proximate Interaction (TA 4.4.3)

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IMAGE GALLERY



The Human Robotics Systems: Space Robotics Challenge element will develop a Centennial Challenge for performing robotic tasks that will be needed to support future human exploration

DETAILS FOR TECHNOLOGY 1

Technology Title

Robonaut 5 Humanoid Robot

Technology Description

This technology is categorized as a hardware system for other applications

This technology is a walking, dexterous humanoid robot designed with terrestrial and space exploration in mind. It is designed to navigate rough terrain and manipulate both human and natural objects.

Capabilities Provided

In addition to a full scale humanoid robot, this technology provides component technologies including; advanced motor controller, affordance template based commanding interfaces, compact motor actuation, battery technology, and impedance control systems of actuators.

Potential Applications

This humanoid technology has space applications of providing robots with human-like capability wherever humans explore in space. This could be before human arrival, working in support of humans during missions and after crew departure.

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Performance Metrics

Metric	Unit	Quantity
Standard robotic platform for robotic exploration	standard	delivery